

# Technological integration and seed sector development:

## two factors of Bt-cotton diffusion in Yangtze River Valley (China)



Michel FOK ([michel.fok@cirad.fr](mailto:michel.fok@cirad.fr))



Naiyin XU ([naiyin@126.com](mailto:naiyin@126.com))

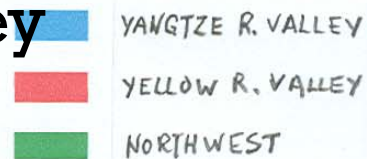
# New message...if not chocking

## ● New paradox

- Large adoption in spite of limited specific advantages
- 2 explanation factors
  - 1 technical & 1 economical

## ● Chocking message?

- Not for Yangtze River Valley (YaRV)...
- ...while information available for Yellow River Valley



## Message based on various data sources

---

- ◎ A specific survey in 2005 in Jiangsu Province (although imperfect)
- ◎ 3 data sets seldom exploited
  - Area data of the National Centre of Extension
  - Data of the Yangtze River Valley multi-location varietal experiment network
  - Data of the National Service for registration of varieties

# Presentation under time constraint

---

## ◎ Presentation sequence

- Features of widespread adoption
- Indication of limited extent of specific advantages
- Bt adoption favoured by pre-existing techniques
- Adoption favoured by the institutional framework for seed market development

## ◎ 3 papers for more information

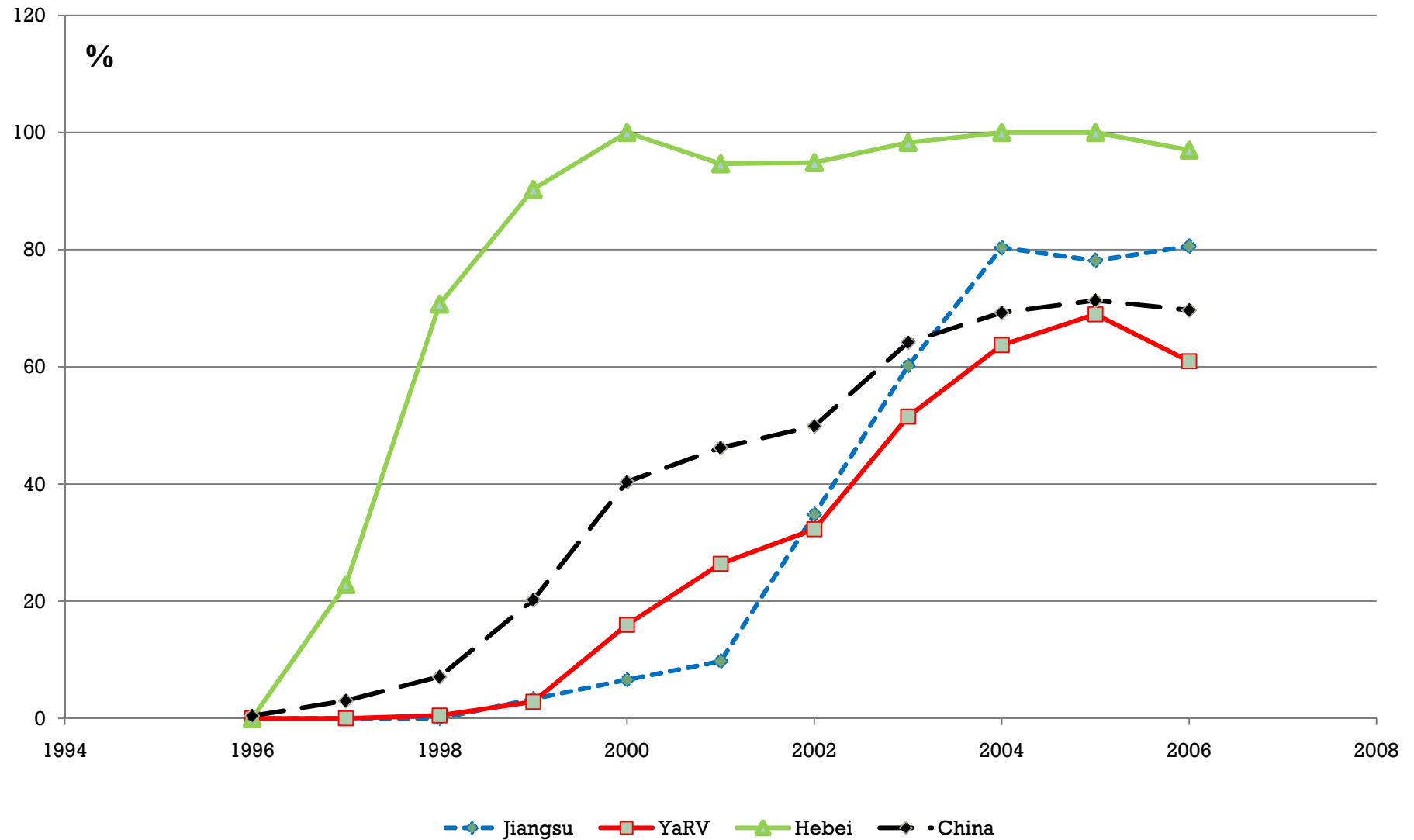
- Fok, M. and N. XU (in press). "Intégration technologique et développement du secteur semencier dans la diffusion du coton-Bt, Vallée du Fleuve Yangtze (Chine)." Economie Rurale. No. 317 (may-june 2010) <http://www.revues.org/3063>
- Fok, M. and N. Xu (in press). "Libéralisation et régulation des marchés de variétés et de semences : analyse du cas du coton-Bt en Chine et dans les pays émergents." Cah. Agric. [http://www.john-libbey-eurotext.fr/fr/revues/agro\\_biotech/agr/e-docs/00/04/51/80/article.phtml](http://www.john-libbey-eurotext.fr/fr/revues/agro_biotech/agr/e-docs/00/04/51/80/article.phtml)
- Xu, N. and M. Fok (in press). "Le marché des variétés de coton-Bt : analyse de la situation en Chine dans une perspective internationale." Cah. Agric. [http://www.john-libbey-eurotext.fr/fr/revues/agro\\_biotech/agr/e-docs/00/04/51/A1/article.phtml](http://www.john-libbey-eurotext.fr/fr/revues/agro_biotech/agr/e-docs/00/04/51/A1/article.phtml)

## Widespread adoption with important share of hybrid varieties

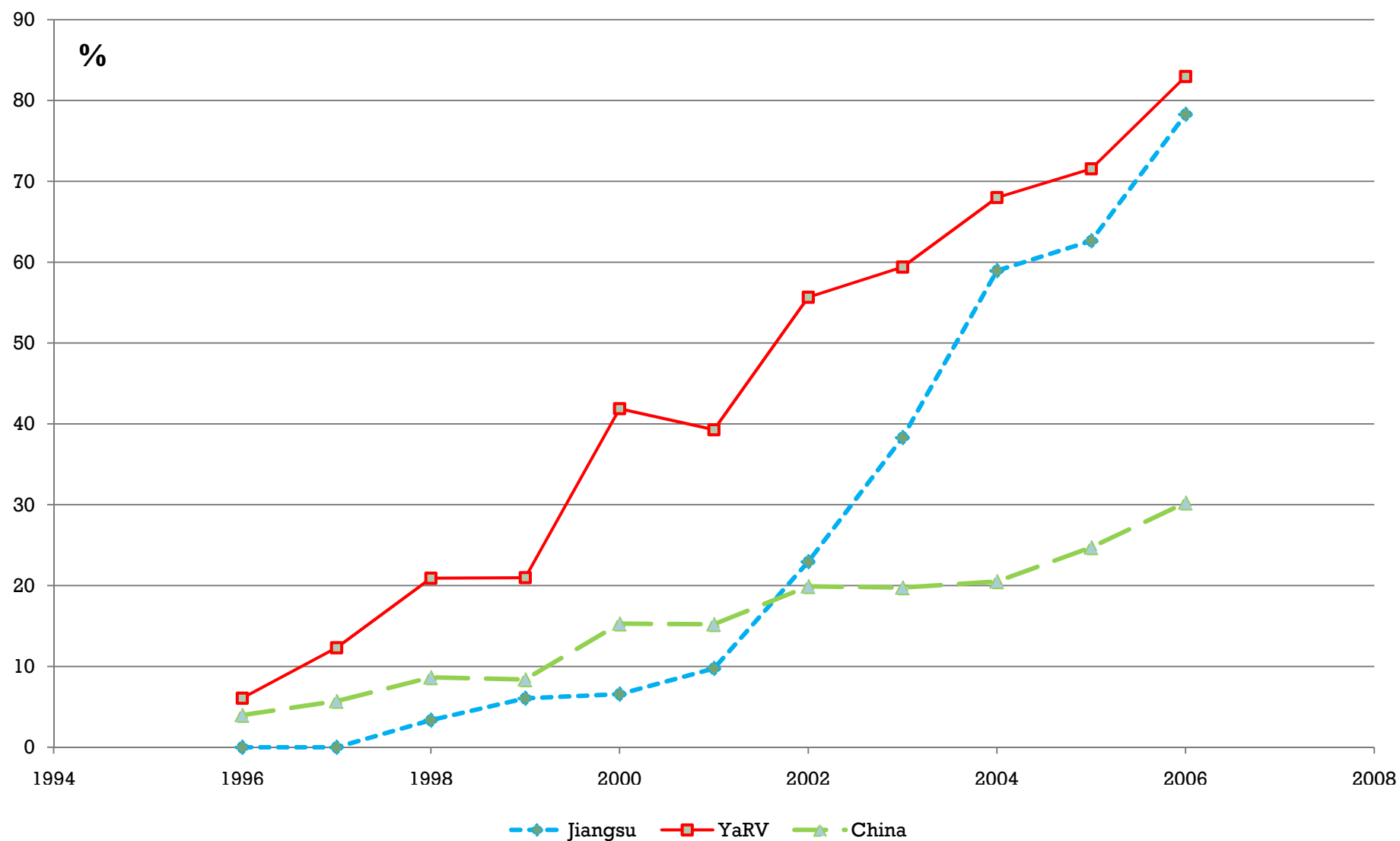
---

- ◎ Large diffusion of Bt cotton in various regions
- ◎ Specificity of YaRV in large adoption of hybrid varieties
- ◎ Very frequent combination of hybrid and Bt traits

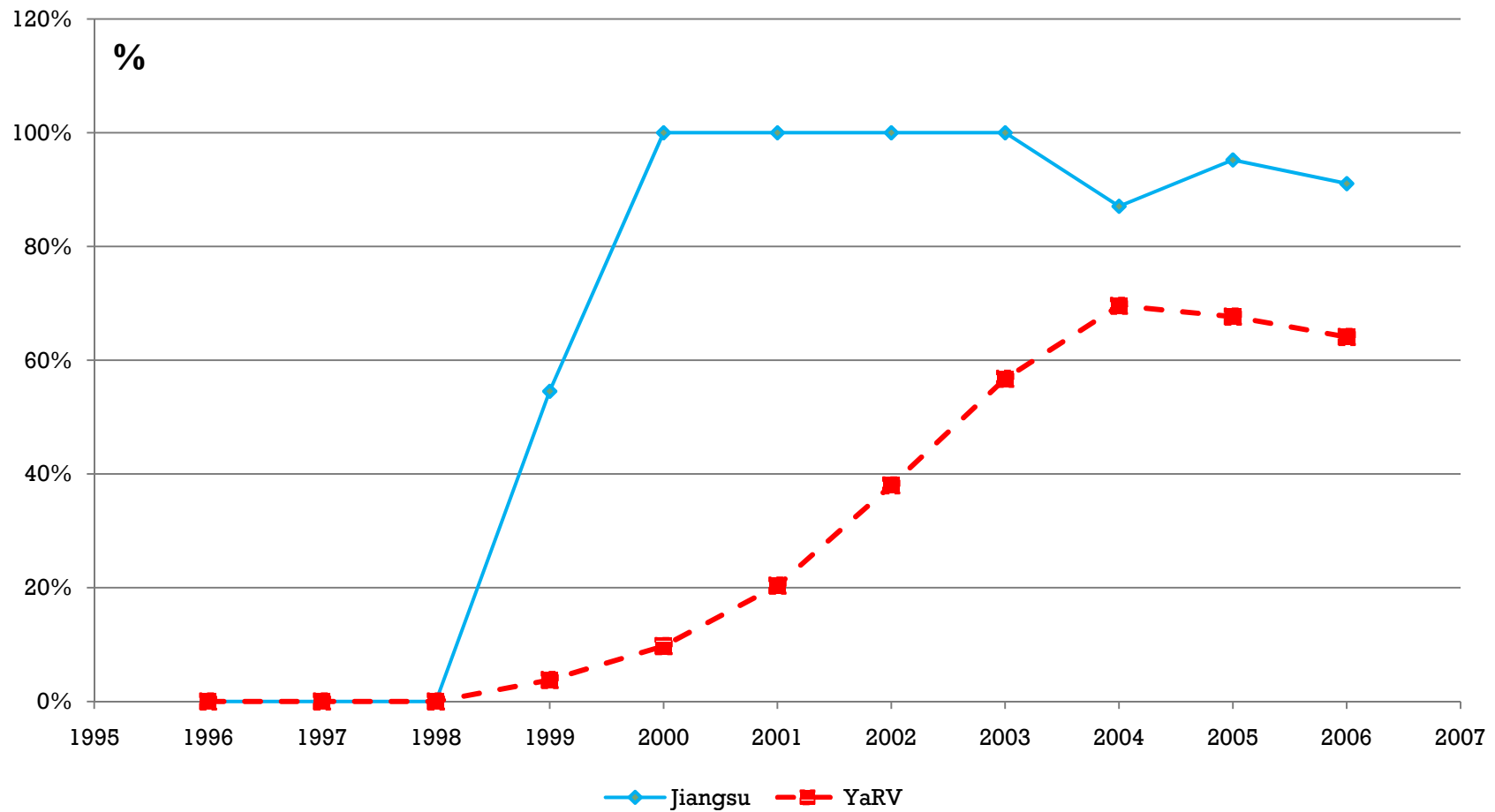
# Bt-share in total cotton areas



# Shares of hybrids in total cotton areas



# Bt shares among hybrid varieties





# Limited extent of specific advantages of Bt-cotton

		Seed cost US\$/ha
Hyb & Bt	Average (std dev)	98.6 (21.7)
	Number data	109
Non-Hyb & Bt	Average (std dev)	6.9 (1.6)
	Number data	10
Hyb & non-Bt	Average (std dev)	84.5 (10.4)
	Number data	3
Non-Hyb & non-Bt	Average (std dev)	7.7 (0.5)
	Number data	4

# Limited extent of specific advantages of Bt-cotton

		Number insecticide sprays
Hyb & Bt	Average (std dev)	12.4 (4.4)
	Number data	77
Non-Hyb & Bt	Average (std dev)	
	Number data	
Hyb & non-Bt	Average (std dev)	16.7 (5.8)
	Number data	3
Non-Hyb & non-Bt	Average (std dev)	
	Number data	

# Limited extent of specific advantages of Bt-cotton

		Insecticide cost US\$/ha
Hyb & Bt	Average (std dev)	85.0 (33.5)
	Number data	77
Non-Hyb & Bt	Average (std dev)	
	Number data	
Hyb & non-Bt	Average (std dev)	141.9 (51.7)
	Number data	3
Non-Hyb & non-Bt	Average (std dev)	
	Number data	

# Limited extent of specific advantages of Bt-cotton

		Seedcotton yield kg/ha
Hyb & Bt	Average (std dev)	4392 (699)
	Number data	140
Non-Hyb & Bt	Average (std dev)	3234 (440)
	Number data	28
Hyb & non-Bt	Average (std dev)	
	Number data	
Non-Hyb & non-Bt	Average (std dev)	3459 (419)
	Number data	5

# Limited extent of specific advantages of Bt-cotton

		Gross income US\$/ha
Hyb & Bt	Average (std dev)	2329 (286)
	Number data	140
Non-Hyb & Bt	Average (std dev)	1600 (286)
	Number data	28
Hyb & non-Bt	Average (std dev)	
	Number data	
Non-Hyb & non-Bt	Average (std dev)	1671 (286)
	Number data	5

# Bt introduction within a process of technological integration

---

- ◎ Seldom attention to pre-existing techniques prior to Bt cotton introduction
- ◎ Pre-existing breakthrough of transplanting and commercial release of hybrid varieties
- ◎ Bt introduction favoring and favored by hybrid variety development
  - Technically easy
  - Economically cheap



# Cotton transplanting in China





# Favorable seed market development and orientation

- ◎ Bt cotton release: factor of seed market modernisation
- ◎ Favorable institutional framework since year 2000
  - Financial incentives to breeders
  - Effectiveness to induce an active seed market
- ◎ Enhanced or excessive competition
  - ...From farmers' seeds
  - Turned around by the option for hybrid varieties
    - Compatible with the process of technological integration





# Active offer of varieties

Period	No. Varieties with areas recorded by Nat. Centre of extension
1990-1999	199
2000-2006	372

Number of breeding organisations having submitted varieties for national registration; 1999-2007

HQ at	Firms	Coll/Univ	Research Institutes	Ag. Services	Total
Counties	9	1	11	1	22
Districts	35	1	31	1	68
Provinces	17	11	26	3	57
Central	2	1	6		9
Total	63	14	74	5	156

# Securing demand for commercial seeds through the option for hybrids

---

Varieties submitted for national registration, 1999-2007

HQ Location of breeding organisations		1999	2000	2004	2007
All China	Number varieties	9	27	73	113
	% Hyb &Bt	0%	26%	30%	58%
YaRV	Number varieties	4	10	16	34
	% Hyb &Bt	0%	30%	44%	88%

## Conclusion : a new concept

---

- New Concept of Techno. Integration, from several levels of synergy
  - Transplanting/hybrid
  - Transplanting/hybrid/Bt
  - Transplanting/hybrid/Bt/seed market development
- Concept possibly valid beyond YaRV
- Concept probably valid beyond Bt-cotton
  - Case of RR soybean and no-tillage

# Conclusion:

## 2 important implications

---

- ① Reduction of Bt effectiveness
  - does not imply quick reduction of Bt-cotton use
- ① Questioning the fairness of pricing Bt cotton seeds
  - Abusive to price seeds like if the observed effects only derive from Bt trait
- ① Worth verifying the accurateness of the concept of techno integration in other conditions.